Effect of some characteristics of cotton (*G. hirsutum*) seedling on early vigor in different morphological leaves

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ABSTRACT

In order to assess early vigor in different cotton (G. hirsutum) phenotypes, a green house experiment was carried out. In this experiment some varieties with normal, okra and super okra leaf were used and germination percent, shoot, root, hypocotyl, radicle and seedling length, seedling dry weight and seedling vigor index were evaluated. The results showed that germination percent and radicle length in okra leaf varieties were more than normal varieties, but normal leaf varieties had more shoot dry weight (P<5%). Among the growth analysis parameters, specific leaf weight (leaf weight to leaf area ratio) was most closely associated with seedling vigor in this research and in okra varieties was more than normal and super okra varieties. Early vigor in okra varieties was more than normal and super okra varieties. But there was no significant difference between normal and super okra varieties.

Introduction

Early vigor is one of the parameters that produces a high potential for optimal utilization of assimilates (Agoers *et al*., 1998; Garuzzi and Borghi, 1996; Phipps *et al*., 1997) and increases fixation capacity (Kumar *et al*., 1986; Lopes-Castanda *et al*., 1996), and because of diminishing seed reserves, seedling growth depends on assimilate production and its allocation to the canopy and weed competition (Richards and Lukacs, 2002). Primary growth is mainly based on more growth. This criterion is important in understanding the crop growth, because it has great effects on natural plant growth during growth period, plant development and controllable and uncontrollable factors. In some plants, early vigor (vigor) is assessed on the basis of more leaf production and biomass accumulation. In different studies, early vigor has been described as more leaf production and plant biomass accumulation at early stages. In a study, early vigor was described as total seedling dry matter. It seems that in canopy development, amount of cotton canopy, evatransporation reduction, more competitive ability with weeds, herbicides use reduction, pests and diseases damages reduction and resistance reduction to herbicides, it seems that identification of its affecting parameters and evaluation of different cotton phenotypes in breeding programs, has important roles in yield promotion and biological and non- biological damages reduction.

Experimental procedure

These greenhouse and lab experiments were conducted in 2001, ten tetraploid cultivars (*G. hirsutum*) of determinate type with normal leaves (Oultan, Caltan, Group1), semi-indeterminate with normal leaves (Shirpan, Shirpan 603, Group2), indeterminate with normal leaves (Sahel, Varamin, Group3), indeterminate with okra leaves (Saiokra, red okra leaf, Group4), and indeterminate with super okra leaves (Super okra, Gol super okra, Group5) were selected and some of their morphological and physiological characteristics were studied.

Results

The results showed that germination percentage of okra leaf cultivars is more that normal leaf ones in greenhouse (P<%5). This was also provided in lab experiment with standard germination test. In this study, Shirpan 603 had the lowest germination percentage (data not shown). Evaluation of seedlings in lab experiments showed that amount of normal seedlings in okra leaf cultivars was more than the others (according to ISTA categories).

However normal seedlings of Sahel were more than Shirpan, Shirpan 603 and Varamin (P<%5), but it had no significant difference with red okra leaf.

In lab, means of radicle length and shoot dry matter of okra leaf were more than the other cultivars. Growth analyses of cultivars, 30 days after germination in greenhouse, showed that SLW (Specific Leaf Weight) of okra leaf cultivars is more than that of semi-indeterminate and indeterminate cultivars with normal leaves (Figure1). Shoot dry matter, 30 days after germination in greenhouse, showed that okra leaf and semi-indeterminate cultivars with normal leaf had the highest and the lowest dry matter, respectively (Figure 2). But there was no significant difference between normal and super okra cultivars in dry matter and early vigor.

Discussion

It is obvious that leaf area of cotton plant is primarily affected by morphological characteristics of canopy and differs from one cultivar to another one (Pettigrew *et al*., 1993). In isogenic lines of cotton, differences in leaf morphology such as size and form, results in LAI (leaf Area Index) (Hunt, 1990) and photosynthesis differences (Agoera *et al*., 1998; Hofmann *et al*., 1986). Faster germination of Okraleaf cultivars than that of other cultivars caused that these cultivars start their growth faster, that increased their above-ground RGR (relative growth rate, data not shown). Some authors stated that amount of bulk density in the seeds of some cultivars is high that increases their germination (Mauney and Stewart 1986; Smith *et al*., 1999). Also, more radicle length and dry matter of these cultivars caused more growth. More SLW of these cultivars is because of their higher thickness related to their leaf area. In general, leaf area of red-leaved okra cultivars

has more sinus depth and less lamina area. Some authors find out that okra and super okra isolines have more carbon exchange ratio in their leaves than normal leaf cultivars and have more photosynthesis per area unit.

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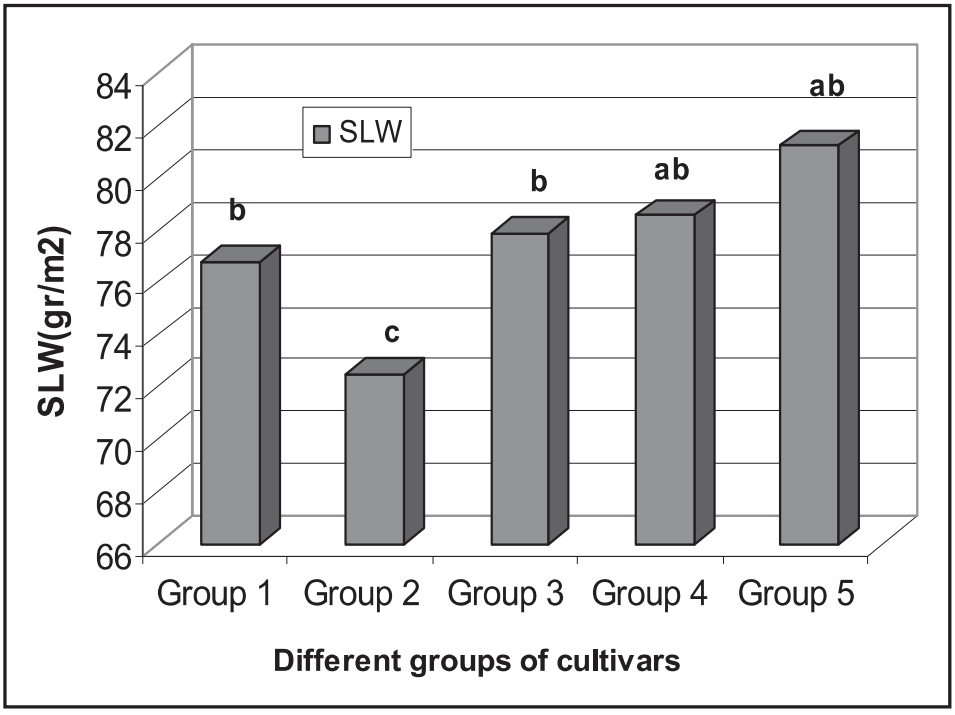

Figure 1. *SLW (specific leaf weight) in different cultivar groups 30 days after germination.*

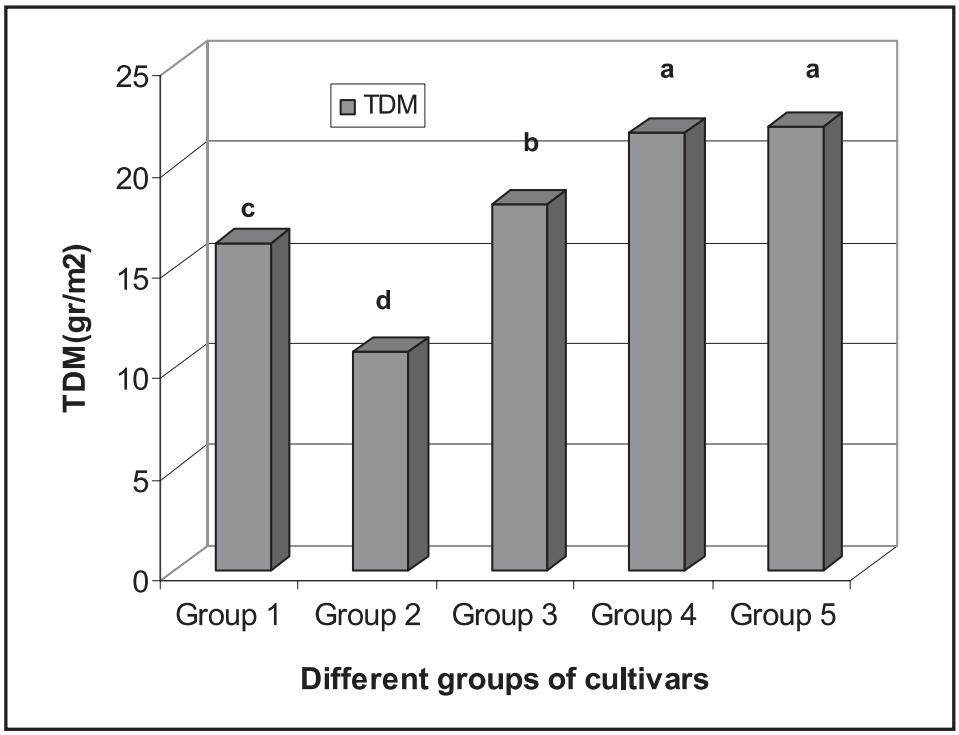

Figure 2.
DM (total dry matter) in different cultivar groups 30 days after germination.